

E3206-03
(#) reissue

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Inventors: Masaharu MIYAHARA et al.

Serial No.: Reissue Application of
U.S. Patent No. 5,940,268
(Issued: August 17, 1999)

Filed: TBD

For: HEAT SINK AND ELECTRONIC DEVICE EMPLOYING THE SAME

ASSENT OF ASSIGNEE TO REISSUE

The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

The undersigned, a duly authorized representative of
Matsushita Electric Industrial Co., Ltd., the Assignee of the
entire interest in U.S. Patent No. 5,940,268, hereby assents to
the above-captioned Reissue Application of said patent.

For and on behalf of

MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

H Kitagawa
(Signature)

Hidemasa Kitagawa
General Manager IP Development Center
Authorized Signing Officer

(Name)

August 6, 2001

(Date)

(Title)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Inventors: Masaharu MIYAHARA et al. ASSIGNMENT BRANCH

Serial No.: Reissue Application of
U.S. Patent No. 5,940,268
(Issued: August 17, 1999)

Filed: August 16, 2001

For: HEAT SINK AND ELECTRONIC DEVICE EMPLOYING THE SAME

STATEMENT OF STATUS AND SUPPORT
FOR ALL CHANGES TO THE CLAIMS

The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

Pursuant to 37 CFR 1.173(c), each of original claims 1-11 is pending and is presently unamended in this reissue application. New claims 12-45 are added. Support therefor is found at least in original Figs. 1-3 and the portions of the specification discussing those figures, including col. 2, line 29-col. 4, line 34. As examples of how the claim elements may be read on the disclosed subject matter, Exhibit I attached hereto shows new

claims 12-45 with reference numerals and pertinent specification
portions inserted therein.

Respectfully submitted,

Date: August 16, 2001

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Exhibit I

12. A heat sink apparatus comprising:

a heat sink apparatus substrate 2 for being attached to a heat emitting element 1, and having a bottom portion with a standing wall 3 mounted thereon,

driving means 6,

a fan 7 mounted on said driving means, and

a cover 8 mounted on said standing wall 3, wherein:

said driving means 6 protrudes through an opening formed on said cover 8 and a height of an upper surface of said fan 7 and a height of an upper surface of said cover 8 are lower than that of an upper surface of said driving means 6 relative to said bottom wall.

13. A heat sink apparatus according to claim 12, wherein said heat sink apparatus substrate has a plurality of fins 5 mounted thereon.

14. A heat sink apparatus for being mounted in an electric device in a state of contact with a heat emitting element 1 comprising, said apparatus comprising:

a housing including an upper wall 8, a lower wall 2 and a side wall 3, said housing having two openings (at A and B in Fig. 3),

a plurality of fins 5 provided in said casing,

driving means 6 provided in said casing, and
a fan 7 rotating by said driving means 6, wherein:
a height of an upper surface of said side wall 3 is lower
than that of an upper surface of said driving means 6 relative to
said lower wall 2 so as to generate a smooth air flow when said
heat sink apparatus is mounted in the electric device so that an
upper surface of said driving means 6 faces a plane surface in
said electric device.

15. A heat sink apparatus according to claim 14, wherein said
fan 7 faces said plurality of fins 5.

16. A heat sink apparatus according to claim 14, wherein said
one (at area B) of said two openings is an outlet opening formed
in a direction normal to an axial direction of said fan 7.

17. A heat sink apparatus according to claim 14, wherein said
fan 7 is a centrifugal fan (col. 3, line 67).

18. A heat sink apparatus for being mounted in an electric
device in a state of contact with a heat emitting element 1, said
apparatus comprising:

a casing having an inlet (at A) and an outlet (at B) for
air;

a driving means 6 provided in said casing and having a
protruding portion (see Fig. 3) therefrom from said inlet of said
casing;

a fan 7 provided in said casing and rotating by said driving means 6; and

a plurality of fins 5 provided in said casing, wherein:
a plane surface in said electric device, said protruding portion of said driving means 6 and a portion of said casing adjacent to said inlet (at A) generate a smooth air flow when said heat sink apparatus is mounted in the electric device so that said inlet is disposed apart from said plane surface.

19. A heat sink apparatus according to claim 18, wherein said fan 7 faces said plurality of fins 5.

20. A beat sink apparatus according to claim 18, wherein said outlet (at B) is formed in a direction normal to an axial direction of said fan 7.

21. A heat sink apparatus according to claim 18, wherein said plane surface in said electric device, said protruding portion of said driving means 6 and said portion of said casing adjacent to said inlet A generate a smooth air flow to said inlet A.

22. A heat sink comprising:

a substrate 2 having a floor and a vertical sidewall 3,
driving means 6; and

a fan 7 rotating by said driving means 6, wherein:

a height of an upper surface of said side wall 3 is lower than that of an upper surface of said driving means 6 relative to

said floor of said substrate 2.

23. A heat sink according to claim 22, wherein the fan 7 has a shape of an axial fan (col. 3, lines 66-67).

24. A heat sink according to claim 22, wherein said driving means 6 has a housing and said height of said upper surface of said side wall 3 is lower than the height of an upper surface of said housing of said driving means 6 relative to said floor of said substrate 2.

25. A heat sink comprising:

a substrate 2 having a floor and a vertical sidewall 3,
driving means 6,
a fan 7 rotating by said driving means 6, and
a plate 8 mounted on an upper surface of said sidewall 3 and
having an opening (at A), wherein:

a height of said upper surface of said side wall 3 and a
height of an upper surface of said plate 8 are lower than that of
an upper surface of said driving means 6 relative to said floor
of said substrate 2.

26. A heat sink according to claim 24, wherein the opening A of
the plate has a size which is large enough to allow the driving
means 6 to penetrate the plate 8 through said opening A but which
is smaller than the fan 7.

27. A heat sink according to claim 26, wherein the fan 7 has a

shape of an axial fan (col. 3, lines 66-67).

28. A heat sink according to claim 25, wher in the fan 7 has a shape of an axial fan (col. 3, lines 66-67).

29. A heat sink comprising:

a substrate 2 having a floor;

driving means 6;

a fan 7 rotating by said driving means 6;

a plate 8 having an opening A;

a vertical side wall structure 3 disposed between said substrate 2 and said plate 8, wherein:

said plate 8 is positioned at an upper surface of said side wall structure 3, and said plate 8 and said side wall structure 3 form a frame having a height which is lower than a height of an upper surface of said driving means 6 relative to said floor of said substrate 2.

30. A heat sink according to Claim 29, wherein said opening A of said plate 8 has a size which is large enough to allow said driving means 6 to penetrate said plate 8 but which is smaller than said fan 7.

31. A heat sink according to claim 29, wherein said fan 7 has the shape of an axial fan (col. 3, lines 66-67).

32. A heat sink according to claim 30, wherein said fan 7 has the shape of an axial fan (col. 3, lines 66-67).

33. A heat sink apparatus comprising:

a heat sink substrate 2 including a bottom wall, a plurality of side walls 3 mounted on each of the sides of said bottom wall except for one side, said bottom wall and a plurality of side walls 3 being formed integrally in a one-piece structure;

a cover 8 providing a first opening B by being mechanically mounted on an edge portion of said side walls 3 and being formed with a second opening A therein;

a motor 6 provided on said heat sink substrate 2 and being disposed adjacent to said second opening A;

a centrifugal fan 7 for being rotated by said motor 6; and

a plurality of fins 5 provided on said bottom wall of said heat sink substrate 2, wherein:

an air flow generated by said centrifugal fan 7 passes from said second opening A to said first opening B.

34. A heat sink apparatus according to Claim 33, wherein said motor 6 protrudes from said second opening A.

35. A heat sink comprising:

a substrate 2 having a floor and a vertical side wall 3 open in one direction;

a plurality of fins 5 vertically projecting from said floor of said substrate 2,

driving means 6 at least a part of which is supported by

said floor of said substrate 2; and

a fan 7 rotated by said driving means 6, wherein:

a height of an upper surface of said side wall 3 is lower than that of an upper surface of said driving means 6 relative to said floor of said substrate 2.

36. A heat sink according to claim 35, characterized in that the fan 7 has a shape of an axial fan (col. 3, lines 66-67).

37. A heat sink according claim 35, wherein said driving means 6 has a housing and said height of said upper surface of said side wall 3 is lower than the height of an upper surface of said housing of said driving means 6 relative to said floor of said substrate 2.

38. A heat sink comprising:

a substrate 2 having a floor and a vertical sidewall 3 open in one direction;

a plurality of fins 5 vertically projecting from said floor of said substrate 2;

driving means 6 at least a part of which is supported by said substrate 2;

a fan 7 for being rotated by said driving means 6; and

a plate 8 mounted on an upper surface of said sidewall 3 and having an opening A, wherein:

a height of said upper surface of said side wall 3 and a

height of an upper surface of said plate 8 are lower than that of an upper surface of said driving means 6 relative to said floor of said substrate 2.

39. A heat sink according to claim 37, wherein the opening A of the plate 8 has a size which is large enough to allow the driving means 6 to penetrate the plate 8 through said opening A but which is smaller in diameter than the fan. 7

40. A heat sink according to claim 39, wherein the fan 7 has a shape of an axial fan (col. 3, lines 66-67).

41. A heat sink according to claim 38, wherein the fan 7 has shape of an axial fan (col. 3, lines 66-67).

42. A heat sink comprising:

a substrate 2 having a floor,

a plurality of fins 5 vertically projecting from said floor of said substrate 2,

driving means 6 at least a part of which is supported by said substrate 2,

a fan 7 rotated by said driving means 6,

a plate 8 having an opening A; and

a vertical side wall structure 3 disposed between said substrate 2 and said plate 8, said vertical side wall structure 3 being open in one direction, said plate 8 being positioned at an upper surface of said side wall structure 3, said plate 8 and

said side wall structure 3 forming a frame having a height which is lower than a height of an upper surface of said driving means 6 relative to said floor of said substrate 2.

43. A heat sink according to claim 42, wherein said opening A of said plate has a size which is large enough to allow said driving means 6 to penetrate said plate 8 but which is smaller in diameter than said fan 7.

44. A heat sink according to claim 42, wherein said fan 7 has the shape of an axial fan (col. 3, lines 66-67).

45. A heat sink according to claim 43, wherein said fan 7 has the shape of an axial fan (col. 3, lines 66-67).